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A NEW FRULLANIA FROM FLORIDA

ALEXANDER W. EVANS

During the past few years Mr. Severin Rapp, of Sanford, Florida, has had the kindness to send the writer a large series of Hepaticae for determination. One of the most interesting of these is a *Frullania*, which is evidently undescribed, and it is a pleasure to associate with this distinct species the name of its discoverer. In the writer's Revision of the North American Species of *Frullania*, published in 1897,[1] those occurring in the United States and Canada are the only ones considered. Twenty-two in all are recognized, two being incompletely known. Since the publication of this paper one of the species, *F. virginica* Gottsche, has been declared synonymous with *F. eboracensis* Gottsche,[2] while another species, *F. saxicola* Aust., has been withdrawn from among the synonyms of *F. eboracensis* and reinstated as a distinct plant.[3] The only other addition which has been made to the list is the tropical *F. gibbosa* Nees, which Stephani has recently reported from Alabama.[4] This and the new species described in the present paper increase the total number to twenty-four. In spite of the fact that *Frullania* is essentially a genus of warm regions, attaining a high degree of development in the tropics of America, only seven species are definitely known from Florida. In addition to the new species these include the following: *F. arietina* Tayl., *F. Donnellii* Aust., *F. eboracensis* Gottsche, *F. Kunzei* Lehm. & Lindenb., *F. obcordata* Lehm. & Lindenb.,[5] and *F. squarrosa* (R., Bl., & Nees) Dumort.

Frullania Rappii SP. NOV.

Dull green, sometimes more or less tinged with brown or red, irregularly scattered or in very loose tufts; stems prostrate and closely appressed to the substratum, copiously and irregularly branched, the vegetative branches sometimes short and limited in growth but often essentially like the stem, usually with smaller leaves near the base: leaves more or less imbricated, sometimes so densely so that the lobules overlap; lobes slightly convex, not squarrose, widely spreading, ovate, 0.75 mm. long and 0.6 mm. wide when well developed, rounded but not cordate at the dorsal base and arching across the axis, rounded to very obtuse at the apex, entire or vaguely sinuate along the margin, sometimes minutely crenulate at the base; lobules galeate (rarely explanate), distant about 0.06 mm. from the axis and averaging about 0.27 × 0.24 mm., subparallel with the axis

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[1] Trans. Connecticut Acad. **10**: 1–39. *pl. 1-15.* 1897.
[2] Rhodora **8**: 44. 1906.
[3] Rhodora **12**: 202. 1910.
[4] Species Hepat. **4**: 344. 1910.
[5] Includes *F. caroliniana* Sulliv. See Evans, BRYOLOGIST **11**: 70. 1908.

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or more or less spreading, truncate and compressed at the mouth, otherwise inflated, especially along the keel; stylus minute, subulate; cells of lobe averaging about 14 μ along the margin, 16 μ in the middle, and 23 μ at the base, trigones distinct, triangular with straight or bulging sides, intermediate thickenings very scanty, oval; cells of lobules with numerous intermediate thickenings and irregular cavities: underleaves distant to subimbricated, plane, broadly ovate, 0.3 mm. long and 0.27 mm. wide when well developed (but often much smaller), cuneate at the base, bifid one third to one half with a narrow sinus and broad divisions, rounded to acute at the apex, entire or unidentate on one or both sides: inflorescence autoicous: ♀ inflorescence borne on a more or less elongated axis, usually giving off a branch just below the involucre; bracts in about three pairs, those of the innermost pair complicate, deeply and unequally bifid, the lobe oblong to obovate, about 0.9 × 0.6 mm., rounded to very bluntly pointed at the apex, entire, lobule ovate, about 0.7 × 0.45 mm., rounded to obtuse at the apex, bearing close to the base a slender lanceolate stylus, measuring about 0.2 × 0.06 mm. when well developed; innermost bracteole connate on one side with a bract, oblong-ovate, about 0.7 × 0.4 mm., bifid about two thirds with a narrow sinus and suberect rounded to acute lobes; perianth about half exserted, about 1 mm. long and 0.75 mm. wide, oblong in outline more or less compressed with sharp lateral keels, rounded to truncate at the apex with a short beak, entire or very minutely crenulate at the mouth, ventral keel broad and sharply two-angled, dorsal keel sharp, about half as long as the perianth, sometimes accompanied by one or two supplementary keels, margins of keels smooth: ♂ inflorescence occupying one or two globoid spikes borne below the involucre (and the subfloral branch); bracts in two or three pairs, closely imbricated, subequally bifid with blunt lobes and an arcuate keel; bracteoles minute and bifid: capsule about 0.4 mm. in diameter; spores averaging 30 μ in short diameter, greenish brown, thick-walled, the surface bearing scattered circular spots, each composed of a series of minute radiating ridges; elaters about 220 × 15 μ, truncate, with a single reddish spiral. (FIGURES 1–9.)

On trees. Sanford, Florida (S. Rapp, Nos. 18 and 21). No. 18, collected in June, 1911, may be designated the type. The accompanying species are *Leptocolea Jooriana* (Aust.) Evans and *Microlejeunea bullata* (Tayl.) Evans.

The new species belongs to Spruce's subgenus *Trachycolea*, which Stephani[1] has recently renamed *Galeiloba* on account of the fact that many of the species have perfectly smooth perianths. According to published descriptions the female inflorescence in certain members of this subgenus is borne on a short lateral branch, while in others it is borne on the main stem or on a leading branch. In Stephani's opinion, however, the inflorescence is invariably borne on a short branch, and any other interpretation is based on a misconception. According to his account the inflorescence sometimes seems to be terminal on a leading branch, but when this is the case an apparent innovation is always developed below the involucre and this apparent innovation really represents the continuation of the main axis. In the course of development the portion of the shoot bearing the

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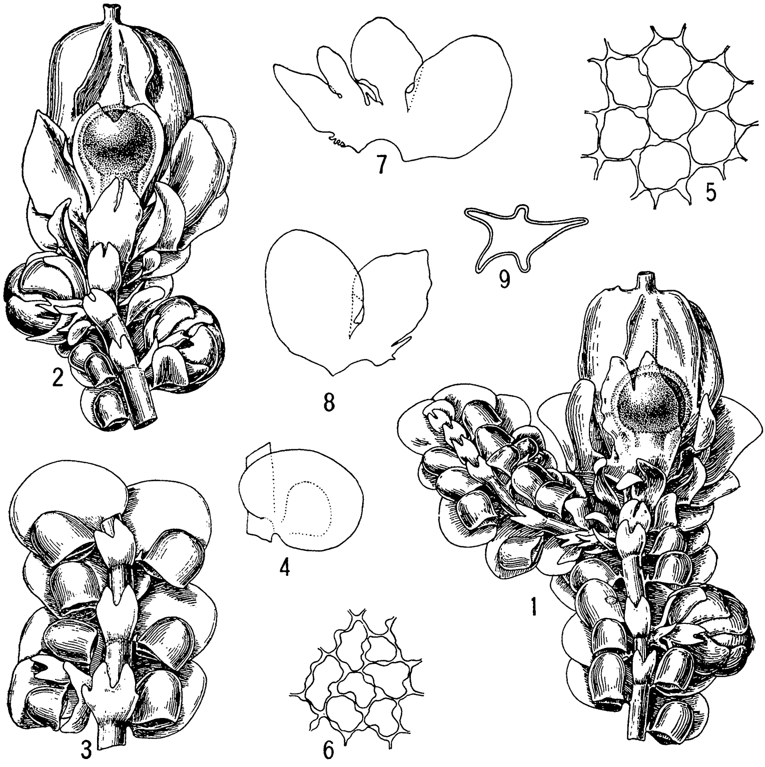
[1] Species Hepat. **4**: 358. 1910.



FRULLANIA RAPPII Evans

FIGS. 1 and 2. Parts of plants, ventral view, showing perianths and antheridial spikes, × 27.

FIG. 3. Part of a stem, ventral view, × 27.

FIG. 4. A leaf, dorsal view, × 27.

FIG. 5. Cells from the middle of a lobe, × 300.

FIG. 6. Cells from a lobule, × 300.

FIGS. 7 and 8. Innermost bracts and bracteole from a single involucre, × 27.

FIG. 9. Transverse section of a perianth in the upper half, × 27.

The figures were all drawn from the type specimen by the writer and prepared for publication by Mr. Stanley C. Ball.

involucre and perianth becomes pushed to one side by the apparent innovation and then shows its true morphological character as a short branch. A careful study of the conditions found in *F. Rappii*, as well as in most of the other North American species of *Trachycolea*, shows that Stephani's ideas cannot be maintained. There are cases. for example, such as the one shown in FIGURE 2, where the female axis bears no branches in the vicinity of the inflorescence except the antheridial spikes. Under these circumstances it would hardly be possible to interpret the portion of the axis bearing the involucre and perianth as a branch of the part below it. But even when the female axis bears what Stephani calls an apparent innovation, as shown in FIGURE I, this always arises in connection with an elobulate leaf of the axis and clearly represents the missing lobule of this leaf, just as in all ordinary branches throughout the genus *Frullania*. The presence of the elobulate leaf shows, therefore, that the apparent innovation represents a true branch and ought not to be regarded as the direct continuation of the axis. When the involucre and perianth become pushed to one side through the robust development of this branch, the axis formed is a sympodium and not a monopodium as Stephani's explanation would imply. It thus seems to be clear that while the female inflorescence is sometimes borne on a short branch, it may in other cases be borne on a leading branch, as previous writers have maintained. Its position, in fact, seems to be constant for a given species and occasionally affords helpful characters in distinguishing between closely related plants.

The cell structure of *F. Rappii* presents a number of interesting peculiarities with respect to the distribution of the local thickenings in the walls. In the lobes of the leaves, trigones are everywhere apparent and frequently bulge out into the cell cavities (FIG. 5). Intermediate thickenings, on the other hand, are rare and many lobes fail to show them altogether. Even on the bracts, the lobes show very few thickenings of this character. The cells of the lobules of the ordinary leaves differ widely from those of the lobes, intermediate thickenings forming a conspicuous feature of their walls (FIG. 6). On the bracts the lobules are still well provided with these thickenings, although there are fewer than on the ordinary leaves. The cells of the underleaves, bracteoles, and perianths are much like those of the lobules of the bracts. In most of the species of *Trachycolea* which have been heretofore described, the thickenings of the walls are fairly uniform throughout all the appendicular organs. In the usual type of cell, represented by such species as *F. eboracensis* and *F. squarrosa*, both trigones and intermediate thickenings are present in practically all the cells, thus making the contours of the cavities wavy. In the rarer type of cell, represented by *F. inflata* Gottsche, *F. Bolanderi* Aust., and their allies, no intermediate thickenings whatever are present, the local thickenings being restricted to the trigones. In these cells the cavities are polygonal in outline with rounded angles. It will be seen at once that the cell structure in *F. Rappii* is intermediate between these two types.

In comparing *F. Rappii* with other species of *Trachycolea* the Cuban *F. cobrensis* Gottsche[1] will be found to be one of its closest allies. This species was found by Wright and distributed without number in his Hepaticae Cubenses, but has not since been collected. It agrees with *F. Rappii* in the following peculiarities: the inflorescence is autoicous; the lobes have the same general form; the lobules present the same type of structure and are relatively large, measuring about 0.2 × 0.18 mm.; the female inflorescence is borne on a leading branch; the bracteole is connate on one side; the perianth shows the same form and a similar distribution of its keels. The Cuban species, however, is distinctly smaller, the lobes of the leaves rarely exceeding a size of 0.4 × 0.3 mm. It is further distinguished by the presence of a distinct group of enlarged and reddish cells at the base of the lobe, the corresponding cells in *F. Rappii* showing no special differentiation. The stylus in *F. cobrensis* also yields a few differences. On the ordinary leaves, it measures about 0.1 × 0.04 mm., and is therefore considerably larger than in *F. Rappii*, where it averages about 0.07 × 0.03 mm. On the perichaetial bracts the difference in size is even more apparent, the stylus in *F. cobrensis* being in the form of a distinct lobe.

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[1] In Stephani, Hedwigia 33: 142. 1894.

In addition to *F. Rappii* no fewer than four autoicous species of *Trachycolea* are known from the United States, the others being *F. inflata*, *F. saxicola* Aust., *F. Oakesiana* Aust., and *F. Catalinae* Evans. The first two of these species have a rather wide distribution and represent southern rather than northern types, the third has a distinctly northern range, while the fourth is known only from California. In all four the cell structure conforms to the second type described above. In many respects *F. inflata* is more closely related to *F. Rappii* than are the other autoicous species. It differs, however, not only in the structure of the cell walls, but also in the size of the cells, which attain a diameter of about 24 μ in the middle of the lobe instead of only 16 μ. Explanate lobules are likewise of frequent occurrence in *F. inflata*, and the perichaetial bracteoles are free from the bracts. In the very similar *F. saxicola* explanate lobules are still more usual, and the mouth of the perianth is remarkable in being occluded by papillae which grow out from the margin and inner surface.

YALE UNIVERSITY.

LEUCODONTOPSIS CARDOT *

(*Leucodoniopsis* R. & C.)

ELIZABETH G. BRITTON

In 1893 this genus was founded on specimens collected in Costa Rica by Tonduz (*no. 5616*) which were described as *L. plicata* R. & C. and type specimens of which they have kindly shared with me, in exchange for some specimens collected by me in the Bahamas in 1904. In both cases the specimens are sterile, but propagate by septate gemmae, growing in clusters in the axils of the

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* P. S. Since writing the above, after notifying M. Cardot and sending him specimens of Dr. Small's *no. 3227* from Grassy Key, Florida, he informs me that the spelling should be *Leucodontopsis*, not *Leucodoniopsis*.